

REMARKS

In the Office Action, claims 1-40 were rejected. By this paper, claims 5-12 and 17-20 are amended to incorporate amendments suggested by the Examiner in a telephonic interview to clarify certain recited features, as will be discussed in further detail below. Further, Applicants strongly believe that the remaining claims, 1-4, 13-16, and 21-40, as previously presented, are distinguishable over the reference cited by the Examiner and, therefore, allowable. As such, claims 1-40 remain pending in the present patent application. In view of the remarks and amendments set forth below, Applicants respectfully request reconsideration and allowance of all pending claims.

Interview Summary

In accordance with 37 C.F.R. §1.133 and M.P.E.P. §713.04, Applicants present the following summary of a telephonic interview between the Examiner, Parikha S. Mehta, Applicants' attorneys, John M. Rariden (Reg. No. 54,388) and Kenneth Liu, and Gopal B. Avinash, a co-inventor in the present application. The interview was conducted on November 19, 2007. During the interview, the parties discussed the rejection of pending claims 1-40 under 35 U.S.C. §102(b) as being anticipated by Huesman et al. (Preliminary studies of cardiac motion in positron emission tomography. *Report LBNL-41433, Lawrence Berkeley National Laboratory*. March 29, 2001) (hereinafter “the Huesman reference”) and, more specifically, the issue of whether the use of term “prospective” in the Huesman reference is consistent with the acquisition of image data using prospective gating points as set forth in the present application.

In particular, Mr. Rariden, Mr. Liu, and Mr. Avinash noted that while the Huesman reference makes wide use of the term “prospectively gating” and the like, it appears that the Huesman reference is merely using what is referred to as “gating states” to bin or classify a continuously acquired and uninterrupted set of image data into various groupings based upon the particular state of motion the organ or organs of interest are undergoing at the time the image data is acquired. *See* Huesman, page 6, paragraph 1; *see also* Fig. 5. In contrast,

the present application defines prospective gating as first analyzing motion data to extract gating points, and then using the extracted gating points to acquire image data, such that image data is acquired *non-continuously* and *only* during intervals defined by the prospective gating points, and not continuously, as appears to be disclosed in the Huesman reference. *See Application*, page 19, line 29 to page 20, line 9; *see also* Fig. 3.

During the interview, the Examiner acknowledged the above distinction between the present application and the Huesman reference but was unwilling to indicate the allowability of the present claim language without further review. While no specific agreement was reached regarding the allowability of the pending claims, the Examiner suggested claim language which the Examiner indicated would likely overcome the outstanding rejections in view of the Huesman reference under Section 102 if incorporated into the pending claims. Therefore, while the Applicants strongly believe that the claim language of claims 1-40, as previously presented, is sufficient to distinguish the present application from the Huesman reference, Applicants have incorporated the Examiner's suggested claim language into independent claims 5-12 and 17-20 in order to overcome the present rejection with regard to those claims. It is believed that the amendments suggested by Examiner do not narrow the scope of the claims in any way. Further, if the Examiner's suggested amendments ultimately place claims 5-12 and 17-20 into condition for allowance, Applicants will consider incorporating the suggested amendments into the remaining unamended claims to expedite prosecution of the present application.

Double Patenting

In the Office Action, the Examiner provisionally rejected claims 1-40 under the judicially created doctrine of obviousness-type double patenting over claims 1-32 of co-pending Application No. 10/723,894 in view of the Huesman reference. In view of the provisional nature of the present double-patenting rejection, Applicants defer response

until an indication of allowable subject matter is received on at least one of the co-pending applications.

Rejections Under 35 U.S.C. §102

The Examiner rejected claim 1-40 under 35 U.S.C. §102 as being anticipated by the Huesman reference. Applicants respectfully traverse this rejection.

Legal Precedent

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *See Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). That is, the prior art reference must show the *identical invention* “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Thus, for anticipation, the cited reference must not only disclose all of the recited features but must also disclose the *part-to-part relationships* between these features. *See Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir. 1984). Accordingly, the Appellants need only point to a single element or claimed relationship not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. A *strict correspondence* between the claimed language and the cited reference must be established for a valid anticipation rejection.

Furthermore, during patent examination, the pending claims must be given an interpretation that is *reasonable* and *consistent* with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §2111 (describing the standards for claim interpretation during prosecution). Indeed, the *specification* is “the primary basis for

construing the claims.” *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005). (Emphasis added). It is usually dispositive. *See id.* Interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. That is, recitations of a claim must be read as they would be interpreted by those of ordinary skill in the art. *See Rexnord Corp. v. Laliram Corp.*, 60 U.S.P.Q.2d 1851, 1854 (Fed. Cir. 2001); *see also* M.P.E.P. §2111.01. In summary, an Examiner, during prosecution, must interpret a claim recitation as one of ordinary skill in the art would reasonably interpret the claim in view of the specification. *See In re American Academy of Science Tech Center*, 70 U.S.P.Q.2d 1827 (Fed. Cir. 2004).

Independent Claims 5-12 and 17-20

Applicants respectfully note that independent claims 5-12 and 17-20 are amended to incorporate the Examiner’s suggested claim amendments which were discussed in the above-referenced interview. As noted above, the amendments are believed to clarify the recited subject matter, and are not believed to narrow the scope of the claimed subject matter in anyway. As amended, independent claims 5-12 and 17-20 generally recite various systems, methods, and computer programs for extracting two or more prospective gating points from a set of motion data *and*, based upon the extracted prospective gating points, initiating and terminating the acquisition of a set of image data representative of an organ of interest. In other words, the recited image data is acquired in an interrupted and non-continuous manner, wherein acquisition of image data is triggered *only* during the time intervals defined by the extracted prospective gating points, and ignored for those intervals outside of the gating intervals.

Much to the contrary, as noted in the above interview summary, Applicants believe that the Huesman reference appears to describe an imaging system that is configured to acquire image data continuously. Further, while the term “prospective gating” is used quite liberally, it does not appear that what the Huesman reference refers

to as “prospective gating” is equivalent or consistent with how “prospective gating” is defined in the present application, as noted above. Rather, the use of what is referred to as “prospective gating” in the Huesman reference appears to be merely binning or classifying a continuous acquisition of uninterrupted image data into different grouping based upon a particular state of motion the organ or organs of interest are undergoing at the time the image data is acquired. As required by well established case law, pending claim *must* be given an interpretation that is *reasonable* and *consistent* with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969). It certainly does not appear that the Huesman reference teaches “prospective gating” in the context of *only* acquiring data at select intervals defined by prospective gating points, as is described by the present application. *See* Application, page 19, line 29 to page 20, line 9; *see also* Fig. 3.

In view of this distinction, Applicants respectfully submit that the claim amendments incorporated into claims 5-12 and 17-20 are consistent with the language suggested by the Examiner for overcoming the current rejection. Therefore, in view of these amendments, Applicants believe claims 5-12 and 17-20 distinguish over the Huesman reference and are in condition for allowance. Thus, in view of the foregoing claim amendments, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of claims 5-12 and 17-20.

Independent Claims 1-4, 13-16, and 21-40

While the above discussed claims have been amended to incorporate the Examiner’s suggested language, Applicants do not believe the amendments narrow the scope of those claims in any way. Further, regarding the remaining claims, Applicants strongly believe that these claims, as previously presented, are distinguishable over the Huesman reference even *without* the Examiner’s suggested amendments. As such, Applicants respectfully note that independent claims 1-4, 13-16, and 21-40 recite various systems, methods, and computer programs utilizing a variety of combinations of one or more types of electrical and/or non-electrical sensors for acquiring motion data for one or

more organs for purposes of imaging. However, *every* independent claim generally recites the following: (1) processing a set of motion data to extract *two or more prospective gating points and two or more retrospective gating points*, and (2) *acquiring* a set of image data representative of an organ of interest (*e.g.*, a human heart) *using* the *two or more prospective gating points*. In other words, the methods, systems and programs described in the present application specify the use of *both prospective and retrospective gating points*. As discussed above, Applicants do not believe the Huesman reference discloses acquiring a set of image data using prospective gating points in a manner that is consistent with the present application.

“Prospective gating” as defined in the present application, utilizes one or more prospective gating points extracted from a set of motion data for one or more organs in order to time the acquisition of data. *See Application*, page 1, lines 22-27. For example, the extracted prospective gating points may correspond to one or more intervals of minimal absolute motion for the organ of interest. *See id.* at page 2, line 30 to page 3, line 5. As discussed above, the present application and the claims are directed to the acquisition of image data in an *interrupted and non-continuous manner*, such that image data is acquired *only* during the time intervals defined by the extracted prospective gating points, and otherwise ignored for those intervals that fall outside of the prospective gating intervals. *See id.* at page 19, line 29 to page 20, line 9; *see also* Fig. 3. By timing the acquisition of image data based upon the prospective gating points, image data is acquired *only* during the intervals defined by the prospective gating points and ignored otherwise. *See id.* As such, the presence of motion artifacts in a resulting image set may be reduced significantly. *See id.* at page 2, line 30 to page 3, line 5.

To the contrary, as discussed above, the Huesman reference appears to describe an imaging system which acquires image data in a manner that is in contrast with the pending claims. While the term “prospective gating” is used liberally, what is referred to as “prospective gating” in the Huesman reference appears to be merely binning or

classifying a continuous acquisition of uninterrupted image data into different grouping based upon a particular state of motion the organ or organs of interest are undergoing at the time the image data is acquired. For example, referring to Figure 5 of the Huesman reference, an imaging system is illustrated for acquiring a continuous stream of data. *See* Huesman, page 6, Fig. 5. The imaging system is configured (e.g., Macintosh® computer running LabVIEW® software) for continuously acquiring data in real time, as illustrated by the cardiac state graph and the respiratory state graph. *See id.* The motions of the cardiac and respiratory organs are further partitioned into various states, each state corresponding to a particular interval in a cycle of motion. *See id.* For example, the Huesman reference partitions the cardiac motion of a heart into state A, denoted as the “end diastole” stage, state B as the “mid diastole/systole” stage, and state C as the “end systole stage.” *See id.* Similarly, respiratory motion is categorized into states I, II, III, IV, and V, depending on various stages of inspiration and expiration in the respiratory organ. *See id.* The continuous acquisition of image data by the illustrated ECAT HR Scanner is grouped according to a “gating state” determined by the combination of the current states of the respiratory and cardiac organs, and stored into an image volume corresponding to the determined gating state. *See id.* Indeed, it appears that the term “prospective gating,” as used in Huesman, merely describes classifying different segments of the image data that is acquired *continuously* without any underlying trigger or conditions. As such, Applicants do not believe that the Huesman reference teaches or even suggests that the image data is acquired *based on* previously extracted gating points, as is described by the present application.

In the above referenced interview, the Examiner expressed concerned that the language of the pending claims was broad, and not sufficient to distinguish the present application from the Huesman reference. Applicants respectfully disagree. Each of the pending claims generally recites: acquiring a set of image data based upon two or more prospective gating points. As discussed above, the present application describes prospective gating as the *non-continuous* acquisition of image data, such that image data for

an organ of interest is acquired *only* during an interval defined by prospective gating points. The Huesman reference, to the contrary, appears to be acquiring image data *continuously*. Moreover, what is described as prospective gating appears to be merely the parsing and binning, based on a gating state, of the acquired image data into an appropriate image volume. It certainly does not appear that the acquisition of the image data is timed based in anyway upon the so called “gating states.”

To provide additional support for this position, Applicants note that the Huesman reference explicitly mentions that “[u]ngated datasets could be synthesized by *summing* the gated data.” Huesman, page 2, paragraph 6. (Emphasis added). In other words, by summing the various groups of binned data, the ungated, or entire original *continuous* set of data may be reconstructed. This is in stark contrast to the recited subject matter, which, as noted above, *only* acquires selective *portions* of the image data based on intervals defined by prospective gating points, and ignores image data outside of the gating intervals. Accordingly, summing only portions of image data would *clearly* not allow reconstruction of a set of continuous uninterrupted image data. As such, Applicants cannot understand how the current claim language could be possibly construed as being anticipated by the Huesman reference. For at least this reason, Applicants believe the pending claims, as previously presented, to be distinguishable over the Huesman reference.

Furthermore, Applicants respectfully note that the pending claims each recite the use of *both* prospective and retrospective gating points. This subject matter appears to be entirely absent from the Huesman reference. In the instant rejection, the Examiner stated that Huesman discloses extracting two prospective gating points associated with a respiratory organ (*e.g.*, end inspiration and end expiration) and extracting two retrospective gating points associated with a heart (*e.g.*, end-diastole and end-systole). However, Applicants cannot identify any language in the Huesman reference upon which the Examiner’s interpretation appears to be based. As described in the Huesman reference, “[t]he cardiac and respiratory states are used to elect an output gating state

from a 2D lookup table.” Huesman, page 6, paragraph 1. Thus, even assuming hypothetically that the “gating states” mentioned in the Huesman reference could be properly correlated with “gating points,” there does not appear to be any difference in the way respiratory and cardiac organs are analyzed to determine the gating state. Therefore, even *if* the gating points could hypothetically be correlated with either prospective or retrospective gating points, it certainly does not appear that the Huesman reference discloses *both* prospective and retrospective gating.

Accordingly, for the reasons described herein, Applicants believe that claims 1-4, 13-16, and 21-40 are distinguishable over the Huesman reference even absent the Examiner’s suggested amendments. As such, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of claims 1-4, 13-16, and 21-40.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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